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"NOT A PRECISE SCIENCE": ASSESSING EFFECTS OF OPERATIONAL FIRES

by

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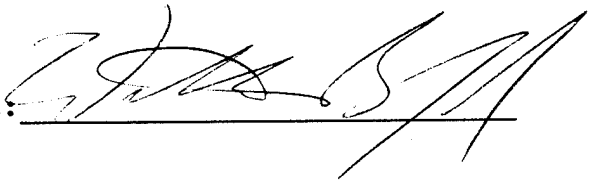
A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: 

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15.Abstract: **Battle Damage Assessment is one area that appears positioned to benefit from high technology collection and analysis systems, but the view is deceiving. The Persian Gulf Conflict revealed that while we had the latest state-of-the-art natinal level reconnaissance available at the operational level, we did BDA the sam way we have always done it--by forming ad hoc structures that do not exist in peacetime, reassessing the questions that we sought to answer with BDA, and tying those answers into the operational commander's evaluation of operational and strategic objectives. Surprisingly, more information did not ease the job, suggesting that we need better intelligence, not more data, and that we must expand our conception of BDA toward "combat assessment"--evaluation of what BDA means to accomplishment of objectives. Current joint doctrine is deficient in providing the "umbrella concept" for joint combat assessment. Despite collection deficiencies at the tactical level, U.S. ability to gather BDA and combat assessment information is unequalled. We need to adopt a doctrinal approach to solving the BDA "problem" for two reasons--to better use what we have and to build a sound base for future equipment and structure decisions.**

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Abstract of

"NOT A PRECISE SCIENCE: ASSESSING EFFECTS OF OPERATIONAL FIRES

Faced with hard choices about the direction to take in harnessing the power of automation and digital communications, the United States can look to recent experience for some of the answers. Battle Damage Assessment is one area that appears positioned to benefit from high technology collection and analysis systems, but the view is deceiving.

The Persian Gulf Conflict revealed that while we had the latest state-of-the-art national level reconnaissance available at the operational level, we did BDA the same way we have always done it--by forming ad hoc structures that do not exist in peacetime, reassessing the questions that we sought to answer with BDA, and tying those answers into the operational commander's evaluation of operational and strategic objectives. Surprisingly, access to more information did not ease the job, suggesting that we need better intelligence, not more data, and that we must expand our conception of BDA toward "combat assessment"--evaluation of what BDA means to larger objectives and not as an end in itself.

Current joint doctrine is deficient in providing the "umbrella concept" for development of joint combat assessment. Despite continuing collection deficiencies at the tactical level, the U.S. capability in gathering BDA and combat assessment information is unequalled. We need to adopt a doctrinal approach to solving the BDA "problem" for two reasons--to better use what we have and to build a sound base for future equipment and structure decisions.

FIGURES

". . . BDA [Battle Damage Assessment] is necessary to determine if the required level of damage has been done to a target or target set, or if ofjectives have been sufficiently achieved to permit progression to the next phase of attack. . . . However, BDA is not a precise science."[1]

Whether one sees the future on the epic scale of a "revolution in military affairs" or from the more pragmatic vantage point of the proponents of "digitization of the battlefield," technology is changing warfare. We are now capable of reaching farther into an enemy's operational depth than we have ever been. We can attack directly his most critical functions at minimal risk to our own forces. We have a joint targeting doctrine that helps us allocate attack forces to target sets prioritized by their value to the enemy and the "pay-off" to us of their neutralization. Our sophistication in command and control combines with unprecedented access to current, accurate data on the enemy's dispositions and accurate, lethal precision guided weapons to assure that we can hit what we shoot at virtually every time. What more could an operational-level commander want, except a feed-back system that lets him assess the effects of his fires?

At first blush, the problem appears to be a simple technical one of acquiring data on targets damaged or destroyed and adding up the results, an approach that works well at the tactical level. Most of what has been written about battle damage assessment (BDA) has looked at the subject from a technical and/or tactical point of view, orienting on getting more data or handling it faster. But the objective of operational fires is, simply stated, to make the enemy react at the operational level.

More data tells the commander what he is doing to the enemy, but it does not tell him how what he is doing to targets is affecting the enemy operationally.

The Secretary of Defense's final report to the Congress on the 1991 Persian Gulf War recognized U.S. shortcomings in assessing effects of attacks on individual targets. More importantly, it also recognized inadequacies in battle damage assessment (BDA) at the operational and strategic levels, concluding that "While the BDA process evolved to the point where it provided sound military assessments at the strategic and operational levels, institutionalization of an effective process remains to be done."[2] What the operational level commander needs is not merely more data about damage to targets but better intelligence about the effects that his fires are having on the enemy at the operational level. That is what this paper is about.

Using the Persian Gulf War for illustration, I will attempt to show how reliance on a primarily technical approach to Battle Damage Assessment of operational fires can leave a major part of the theater commander's intelligence needs unmet, focus his attention at too low a level, and lead him into adhering to inappropriate measures of effectiveness for too long. Secondly, I will look briefly at how current joint doctrine addresses the battle damage assessment issues raised in the Gulf at the operational level of war. I will conclude with some thoughts about the approach we might take to developing a coherent joint

assessment process and structure that meets the needs of the operational level commander.

SHORTFALLS IN THE CURRENT SYSTEM

Our current BDA doctrine developed as a necessary aspect of our targeting process. The targeting cycle (Figure 1) begins with the commander's objectives and guidance and follows a logical sequence of selecting targets that will most probably contribute to achieving those goals, picking the best available means and forces to attack, planning the attack, attacking, and assessing the results of the effort. Assessment allows us to determine whether our first attempts at neutralizing a targeted part of the enemy's power has been successful and whether we need to continue striking it. In its basic form, BDA answers three questions:

--Was the target hit?
--What was the extent of damage? (both physical and functional)
--Was the objective met? (yes or no)[3]

It looks simple enough. If the answer to question one is "yes," and if the damage objective for that target was "n" percent and the extent of damage was "n-1" percent, then the answer to question three is "no," and we must restrike it, right? At the tactical level and from the service component point of view, that is absolutely correct. But let's look a little farther from the target before we answer that question.

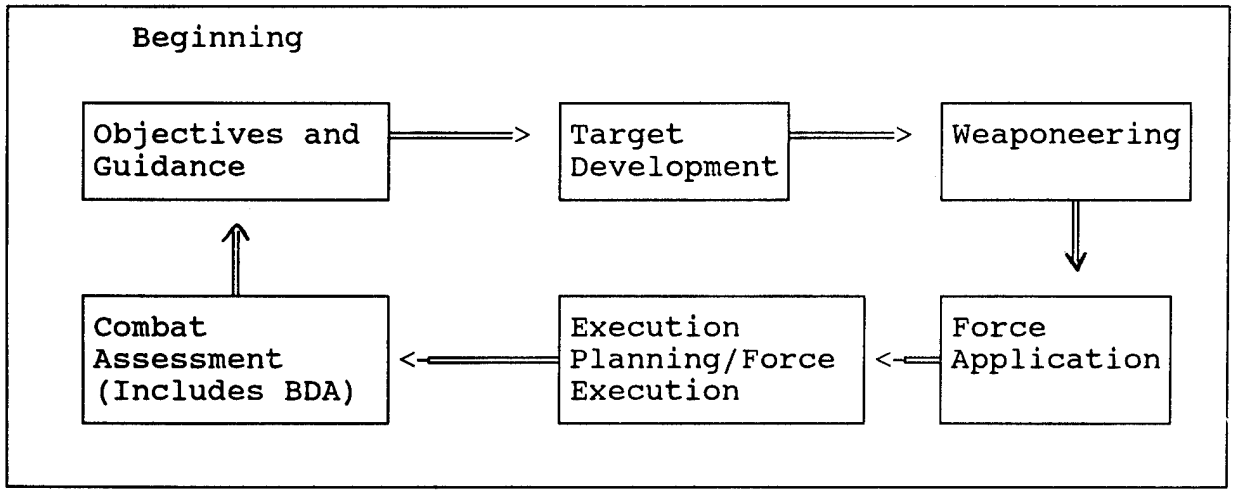

Figure 1: The Targeting Cycle

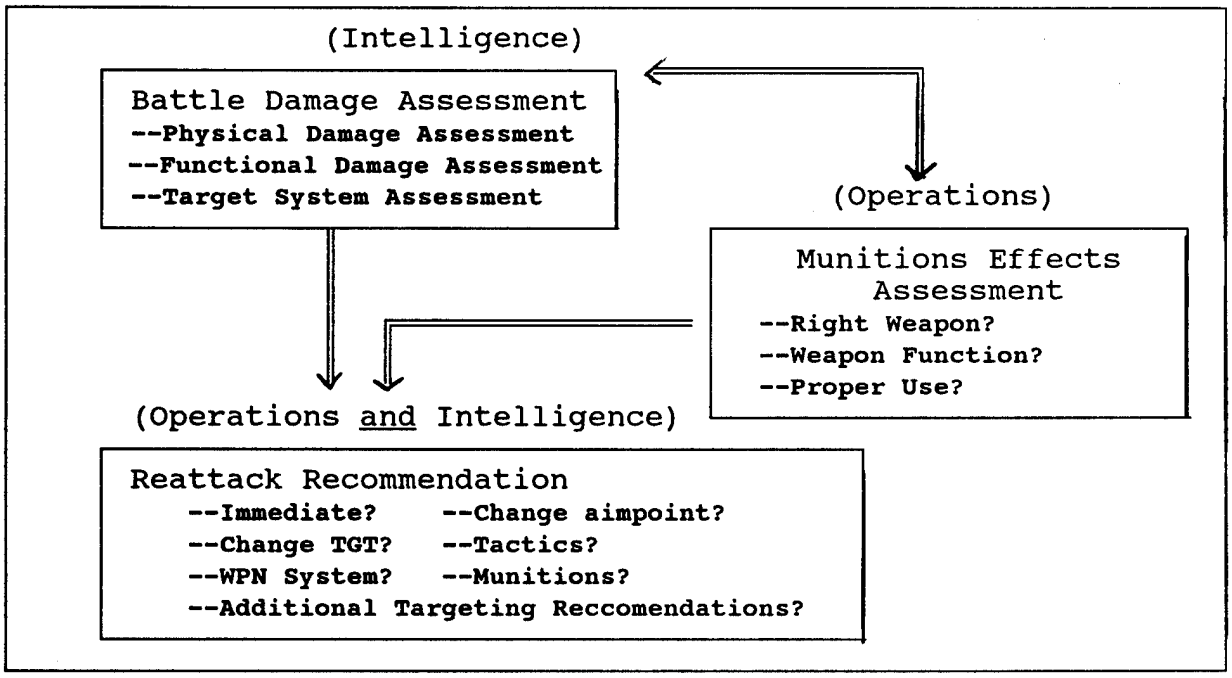

Figure 2--The Combat Assessment Cycle

Battle Damage Assessment (BDA) is only one part of the model. Note that the model in Figure 1 uses the term combat assessment, which includes BDA as one of its parts (see Figure 2). Some of the operational commander's problem comes from imprecise use of the term "BDA" to describe a wide range of assessment processes across the levels of war and across the component services. BDA is critical to the tactical commander; it tells him when (or if) he is achieving his objectives in a very immediate way. Certainly BDA and the similar but more narrowly defined "bomb damage assessment" are useful to the operational commander. For some targets with direct potential for affecting strategic or operational objectives, BDA is of critical importance to him, too. But BDA it is only one part of the intelligence that he needs. The Persian Gulf War provides ample illustrations.

INTEGRATING TARGETING WITH OPERATIONAL PLANNING

The targeting cycle begins with a plan based on strategic goals and guidance and some level of knowledge and assumptions about enemy and about friendly capabilities. At the operational level of war, the commander organizes and conducts campaigns and major operations to achieve strategic objectives and "provide[s] the means by which tactical successes are exploited to achieve strategic objectives."[4] In the Gulf War, the Commander-in-Chief, U.S. Central Command (CINCCENT), identified three centers of

gravity for Iraq: 1) Saddam Hussein's command and control and leadership, 2) Iraq's nuclear, biological, and chemical (NBC) weapons capability, and 3) the Republican Guard military forces.[5] These corresponded roughly to four planned phases, culminating in an offensive ground "campaign" that was over in one hundred hours from start to finish.

The problem with plans is that they neither consider a real enemy nor the effects of what Clausewitz called the "fog" and "friction" of war. During peacetime exercises before the Persian Gulf War, we had fallen into the trap of using optimum effects for our weapons, assuming that the desired level of damage would be achieved if only we shot enough of the appropriate munitions and hit the target. In fact, some of our most widely used simulations still give credit for some kills if we fire weapons into any 3-kilometer hexagon where the enemy has equipment, effectively assuming away target location error or the possibility of multiple strikes on the same target and breeding "gamesmanship." We got our exercise BDA "on the cheap" and did not resource it for wartime.

In the event, we had no problem hitting targets and no shortage of munitions, but the outcome was not what we expected. We began the war with expectations of based on best case probabilities. We sought not only to make our measures of effectiveness (MOEs) quantifiable, but we chose MOEs in anticipation of easy estimation of damage done to each of a set of targets, a predictable enemy, and an almost mathematical

transition from one phase to the next. We found that obtaining good BDA required effort comparable to the attacks that inflicted the damage, and we suffered some surprises before we learned the truth of what Clausewitz had written years before:

> ". . . absolute, so-called mathematical, factors never find a firm basis in military calculations. From the very start there is an interplay of possiblities, probabilities, good luck and bad that weaves its way throughout the . . . tapestry. In the whole range of human activities, war most closely resembles a game of cards."[6]

OPERATIONAL FIRES IN DESERT STORM

Operational fires in the form of air strikes dominated the execution of Phases I-III (the Air Campaign) of Operation Desert Storm and set the stage for Phase IV. Analysis of those phases reveals that the answer to the third question of BDA, "Was the objective met?", involves more than verifying that all of the targets were damaged.

The air campaign had five operational objectives calculated to attack, directly or indirectly, Iraqi centers of gravity:

--Isolate and incapacitate the Iraqi regime
--Destroy Iraq's known NBC warfare capability
--Gain and maintain air supremacy
--Eliminate offensive military capability by destroying key military production, infrastructure, and power capabilities
--Render the Iraqi Army and its mechanized equipment in the KTO ineffective, causing its collapse.[7]

Virtually all of the air campaign missions in support of those objectives met the descriptive criteria for operational fires. The air strikes supported strategic and operational objectives, were separated in time and space from the main tactical effort

(the ground offensive "campaign"), took place throughout the depth of the enemy's battlespace, were not intended to seize and hold ground, isolated the battlefield, and utilized forces and assets other than those required for routine support of tactical maneuver.[8]

The political process continued during most of the air campaign, and up to a point it seemed possible that the ground campaign would not have to be launched if the air strikes could lead to achievement of U.S. and United Nations objectives. It was critical that CINCCENT have accurate assessments of how well his air campaign had achieved operational objectives so that he could advise the National Command Authority, reassess his own plan and adjust his objectives to reflect the realities of execution instead of the probabilities of planning. The inability of BDA alone to provide the necessary information became apparent early on. Strikes on aircraft and communications facilities obviously hit their targets, but the PGM used left only small entry holes and made imagery-based assessment almost impossible. The issues became most obvious in the third phase, preparation of the battlefield prior to offensive ground operations.

Computer models run prior to the war told air planners that it would take "about a month" of air attacks to destroy 75 to 80 percent of the armored vehicles, trucks and artillery of the regular Iraqi army in Kuwait. Given historical evidence showing that attrition levels of 20 to 50 percent usually render a

military force combat ineffective, CINCCENT adopted destruction of 50 percent of those forces as the goal for Phase III and the trigger for starting the ground offensive with favorable force ratios.[9] Ironically, our technology--and our success--made it harder, not easier to determine how much damage we were doing to the enemy. And the Iraqis did some things that got in the way.

Despite smoke from burning oil wells and the occasional sand storm, there has probably never been a better place to acquire imagery of a deployed enemy than the KTO. Yet even reliable tactical BDA proved hard to get. Our precision weapons proved capable of "killing" armored vehicles without catastrophic destruction. The absence of Iraqi defensive air cover and the presence of short range air defense systems near targets caused coalition forces to rely on missiles and guided bombs launched from high altitudes instead of getting down on the deck near targets. As a result, analysts relying on imagery could not tell if individual vehicles had even been hit once, not at all, or multiple times--much less to what extent. As the Secretary of Defense's report to the Congress put it, "Even secondary explosions don't guarantee target destruction."[10] We probably restruck many vehicles that had already been neutralized with minimal visible damage. The Iraqis began to light oil cans on or near tanks that had not been struck to deceive pilots and moving away from equipment so that they would not be hit by missiles fired from planes that they could not even see, much less defend against. It all added to the confusion. Even gun-camera tape

became suspect after a while, not because the pilots were not hitting targets, but because there was no way to tell whether they were hitting a target that was already out of action.

A major fight developed along service component lines over how BDA was to be counted. It, as does the solution that CENTCOM adopted, illustrates the need for joint doctrine to resolve BDA issues. The CENTAF (Air Component of CENTCOM) Director of Intelligence provided all BDA for targets attacked by air while ARCENT (Army Component of CENTCOM) provided assessment of combat effectiveness of Iraqi ground forces in the KTO, less those in the Marine Component (MARCENT) area.[11] The approaches were fundamentally different. Committed to its system of striking off targets as they were hit, AFCENT (abetted by some strong support from General McPeak, the Air Force Chief of Staff in Washington)[12] came up with very different estimates of remaining ground force capability than did the Army. While the Air Force was lobbying for resuming deep strikes against targets in Baghdad, the CENTCOM J-2 was ruling on the basis of U-2 photography that the Republican Guard's Tawalkana division was at 74 percent strength instead of the 48 percent claimed by AFCENT.[13]

Other agencies used even more conservative estimates. On 23 February, the eve of the ground offensive, the JCS/CENTCOM briefed the President that the Iraqis had lost 39 percent of their tanks, 32 percent of their armored personnel carriers, and 47 percent of their artillery. The CIA estimated losses at 12%/9%/8% and the DIA pegged them at 16%/13%/20% for the same

items.[14] Obviously, counting pieces of enemy "stuff" was not very useful for making decisions, even in the most hospitable environment for imagery that we are ever likely to encounter.

THE IMMEDIATE SOLUTION

CINCCENT finally resolved the problem that he faced by looking beyond the BDA numbers and returning to intelligence fundamentals. The CENTCOM J-2 developed a methodoloy to incorporate all available sources--national systems, mission reports, deserter reports, and gun camera film--with subjective analysis and sound military judgment.[15] The J-2 changed the way he briefed the CINC and displayed target sets with indicators of actual observable damage and an assessment of the degree to which CINCCENT's objectives had been met. Some problems were never solved. To avoid overstating operational accomplishments, the use of imagery to verify damage remained policy, one which "in some cases . . . seems to have precluded making rapid judgements about what probably had been accomplished."[16]

Lieutenant General Bernard E. Trainor, USMC (ret.) and Michael R. Gordon have cited the battle at Khafji (28-30 January 1991) as evidence that CENTCOM was too tied to details to change. They argue that the coalition rout of the three-division Iraqi attack at Khafji confirmed serious Iraqi vulnerability to air attack (despite the numbers conflict between the CIA, DIA, and CENTCOM) as well other weaknesses that were exploitable by a change in campaign plans.[17] Ultimately, fixation on the numbers

had blinded CENTCOM to other, less quantifiable but valid indicators of Iraqi combat capabilities.

The Secretary of Defense's report to the Congress says that Iraqi reactions contributed to analysis of their military capability and that Khafji provided key evidence of Iraqi inablity to orchestrate a complex mobile defense and loss of will.[18] Yet the trigger for starting the ground campaign did not change. Post-war analysis revealed that the air campaign actually fell short of the goal of destroying 50 percent of the total Iraqi artillery and armor in the KTO. It turned out not to matter because, as General Trainor put it:

> ". . . the numbers game missed the larger point. CENTCOM had put the bar too high. The threshold for the disintegration of the Iraqi army was considerably less than 50 percent and was surpassed during the bombing campaign."[19]

That statement is the essence of operational art. More, it suggests a caution about the efficacy of numbers and quantifiable MOEs as we move to solve our BDA "problems."

WHERE ARE WE NOW?

At the Joint Doctrine level, "institutionalization of an effective process"[20] still remains to be done five years after the Gulf War. Joint Doctrine makes no mention of operational fires in those terms, talking instead about "joint" fire support and "joint" interdiction in terms that sound vaguely reminiscent of the purposes of operational fires but are much more useful to component commanders than to operational commanders. Joint Pub

3-09.1 deals with joint laser designation tactics, techniques and procedures (TTP), Pub 3-09.2 deals with TTP for joint radar beacon operations, and 3-09.3 contains Joint TTP for close air support. Their focus is to reconcile differences in the way the various service components do things independently.

I make no argument that such detailed publications are unnecessary. Clearly they are, but we also need a governing doctrine to establish a common vocabulary, eliminate confusion, and raise the concept of combat assessment from the level of the engagement to the operational level. It is especially critical when such concepts as BDA have application across the full spectrum of war, from tactical to strategic, but have very different applications at each level. Joint Pub 2-0, Joint Doctrine for Intelligence Support Operations, is a good example of getting it about right. It refers to combat assessment as the start of the retasking cycle at one level but makes it clear that at the Joint Forces Commander level,

> ". . . the CA effort should be a joint program, supported at all levels, designed to determine if the required effects on the adversary envisioned in the campaign or operation plan are being achieved by the joint force component to meet the JFC's overall concept. The intent is to analyze what is known about the damage inflicted on the adversary with sound military judgment to try to determine: what physical attrition the adversary has suffered; what effect the efforts have on the adversary's plans or capabilities; and what, if any, changes or additional efforts need to take place to meet the objectives of the current major operations or phase of the campaign."[21]

At the CINC level, the lessons learned are much closer to

being made permanent. The CENTCOM BDA Directive of January 1994 does not use the term "combat assessment" but relates BDA to the "level to which strategic, operational, or tactical objectives have been achieved relative to a target, target critical elements, target systems, and enemy combat units."[22] On the subject of specific MOEs, the CENTCOM position, post Desert Storm, is that BDA is part art as well as science and ". . . while specific methodologies should be employed to assist the BDA effort, 'judgment' will continue to play a role . . .."[23] Finally, CENTCOM recognizes that "delegation of responsibilities for BDA along service oriented lines does not work."[24] The CENTCOM answer has been to make the J-2 the arbiter of combat assessment with full staff and component input and to correct the ad hoc nature of BDA in the Gulf by making BDA a major training objective for every CENTCOM exercise.

The process is formalized in a report titled "CINCCENT Assessment of Battle Damage" that provides the NCA, CJCS, national level agencies and the service components with the CINCCENT's definitive position on combat results in the AOR. Key elements include assessment of success in achieving strategic and operational objectives, status of enemy forces, and a description of significant BDA events. It has two purposes: to aid decision making and to provide guidance to the ATO process.[25]

WHERE DO WE GO FROM HERE?

The review of BDA from the Persian Gulf War rated it as a

qualified success. The bottom line of the Secretary's final report to the Congress was that "BDA in the Gulf War used state-of-the-art imagery reconnaissance systems but was done the way it has always been done."[26] The report recognized a need to pursue improving the capability along two axes, one technological, the other doctrinal. The first would keep up with weapons advances and deal with the difficulties of assessing high technology weapons damage to hardened structures and individual vehicles (tanks or mobile missile launchers). The second would institutionalize, improve, resource, and practice in training events the procedures that were worked out under fire and the pressure of time. The answer lies somewhere in the balancing of the two approaches.

Certainly we need some additional BDA assets, particularly at the tactical level where the commander needs rapid, high resolution coverage over a relatively small area. Even at the operational and strategic levels, we sometimes need BDA information in detail about specific targets, but we more often need intelligence about what hitting that target causes the enemy to do. Often that reaction will be a policy decision or a shift of resources that might not show up for days or weeks. Sometimes the reaction will even be to do nothing; and it won't be visible or measureable at all. After Operation Eldorado Canyon in Libya in 1986, the tactical bomb damage was questionable. Cloud cover kept us from seeing the ground from space. In the end, though, it was irrelevant from the operational perspective. The only

valid MOE was whether the strike got the message to Colonel Khadaffi that continued support of terrorists would not pay.

The real problem is not in acquiring information. It is in acquiring the wrong information or more information than we can sort to find the important parts. Computers, digital data links, unmanned aerial reconnaissance vehicles, more and better satellites, all give us the technical capability to get, sort, and store information. But the experience in the Gulf War suggests that the real problem was in the fusion of the available information from a variety of sources, in figuring out what it meant. Reliance on data alone is what led us to adopt a plan that enabled the Iraqis to get over 800 tanks and almost 1,500 personnel carriers out of the theater after we had shot enough PGMs (with 80-90 percent hit probability) at them to kill every one of them.[27]

The value of pursuing the doctrinal approach first, or at least at the same time we investigate the technological potential, is that a sound doctrine will guide our equipment developments into useful areas. As Air Force Master Sergeant Douglas Armstrong wrote in 1992:

> "The United States already possesses sophisticated technical means of collecting intelligence in the broadest areas of the electromagnetic spectrum. Twenty years of research and development have brought us to the threshold of complete tactical and strategic surveillance of both the battlefield and the hinterland--most of it in near real-time. The process is filled with problems, though. The right questions must be asked. The right priorities must be assigned to collection objectives and to the reports disseminated to those who are asking . . . who, in turn must know how to use the information . . .. The right

> people must be given access to data. This is the science--and art--of the intelligence production cycle.[28]

We must not hesitate to step across that threshold, but we, like the leader of a squad taking down an occupied room, should think about what we will do once we are in the room. Technology alone is not the answer. We do not need information at the CINC level just because we have the capability to get it. The pictures of PGM strikes against bunkers and aircraft shelters in the Persian Gulf War made good television, but CINCCENT could not find out what was in there, how badly it was damaged, or what it meant to Saddam Hussein from those pictures. He had to wait until Iraqi pilots started flying one-way trips to Iran and somebody thought about what that meant to his ability to shift the air campaign from Phase II to Phase III.

There is an old saying in the intelligence community that intelligence comes three ways: cheap, fast, and good. It goes on to stipulate that you can't have all three at the same time. Cheap and fast can't be good; cheap and good can't be fast; and fast and good can't be cheap. In the era of shrinking budgets and expanding technological possiblities, we will continue to need good BDA. But before we start investing heavily in technology that will attempt to make a precise science of what involves a substantial element of operational art, we need a doctrine that specifies what we want to do with BDA, what structure we need to integrate it from the tactical to the national level, who will be responsible for managing it, and what

training and manpower resources we will put into sustaining it in peacetime. If we are not careful, we could end up having a state-of-the-art system that provides everything but nothing useful--like the character in the Bruce Springsteen song whose TV receives "fifty-seven channels, but nothin's on."

NOTES

[1] U.S. Department of Defense, Conduct of the Persian Gulf Conflict: Final Report to Congress (Washington: 1992), C-14.

[2] Ibid., C-15.

[3] U.S. Defense Intelligence Agency, BDA Quick Guide (Washington: 1996), 1.

[4] U.S. Joint Chiefs of Staff, Doctrine for Joint Operations, Joint Pub 3-0 (Washington: 1995), GL-II.

[5] Conduct of the Persian Gulf Conflict, 94.

[6] Clausewitz, Carl von, On War, (Princeton: Princeton Univ. Press, 1976), 86.

[7] Conduct of the Persian Gulf Conflict, 100.

[8] Joint Military Operations Department, "Operational Functions" in Operational Art: A Book of Readings (Newport: U.S. Naval War College, 1996), 6-8.

[9] Conduct of the Persian Gulf Conflict, 120, 124.

[10] Ibid., C-14/15.

[11] Ibid., C-15.

[12] Michael R. Gordon and Bernard E. Trainor, The Generals' War: The Inside Story of the Conflict in the Gulf (Boston: Little, Brown and Company, 1995), 328-329.

[13] Ibid., 329.

[14] Ibid., 335.

[15] Conduct of the Persian Gulf Conflict, C-15.

[16] Ibid., 239.

[17] Gordon and Trainor, 289.

[18] Conduct of the Persian Gulf Conflict, 120.

[19] Gordon and Trainor, 331.

[20] Conduct of the Persian Gulf Conflict, C-15.

[21] U.S. Joint Chiefs of Staff, Joint Doctrine for Intelligence Support to Operations, Joint Pub 2-0 (Washington: 1995), VI-10 to VI-12.

[22] U. S. Central Command, BDA Directive (McDill AFB, FL: 1994), II-2.

[23] Ibid., II-3.

[24] Ibid., II-3, 4.

[25] Ibid., II-5.

[26] Conduct of the Persian Gulf Conflict, C-14, 15.

[27] Ibid., 185; Gordon and Trainor, 430.

[28] Armstrong, Douglas G., "The Gulf War's Patched-Together Intelligence," U.S. Naval Institute Proceedings, November 1992, 109.

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